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> Further refinements to modelled SA4 level Labour Force estimates using administrative data

Further refinements to modelled SA4 level Labour Force estimates using administrative data

Update on a new model for producing enhanced regional Labour Force estimates and plans for ongoing outputs

Released 30/10/2023

Source: [Labour Force, Australia, August 2023](#)
[Labour Force, Australia, Detailed, August 2023](#)

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Background

The [Labour Force Survey \(/statistics/labour/employment-and-unemployment/labour-force-australia/latest-release\)](#) (LFS) is designed primarily to provide national estimates of labour market activity, with the secondary design objective of producing state and territory estimates.

While the LFS is not designed to produce regional estimates, Statistical Area Level 4 (SA4) estimates are produced as a by-product of the large sample size required to produce high quality national estimates. As a result, these regional estimates are of a lower level of statistical quality compared to those at the national and state and territory levels.

Regional labour force statistics are in high demand and the Australian Bureau of Statistics (ABS) has been funded to improve the quality of key regional estimates using administrative data and a new model.

In June 2023, the ABS published an information paper outlining the quality limitations of direct survey estimates and the new model for producing improved SA4 estimates. It also included illustrative results for SA4s based on a preliminary version of the model. For further information, please see: [Improving SA4 level estimates from the Labour Force Survey using administrative data models \(/statistics/detailed-methodology-information/information-papers/improving-sa4-level-estimates-labour-force-survey-using-administrative-data-models\)](#).

This information paper provides an update on progress towards releasing higher quality regional labour force statistics, including:

- refinements to the model that will be used to produce improved SA4 level estimates
- updated SA4 estimates through to August 2023, based on the refined version of the model
- information on release plans, including timing
- plans to continue enhancing regional labour force statistics through modelling finer level sub-state estimates.

Alongside today's paper, the ABS has released [A Rao-Yu model for small area estimation of labour force statistics \(/statistics/research/rao-yu-model-small-area-estimation-labour-force-statistics\)](#). This Methodology Advisory Committee research paper, presented in August 2023, provides additional detail on the Rao-Yu area-level time series model used to produce these estimates.

Refinements to the model

The ABS has applied several refinements to the model used to produce these estimates since the release of the June 2023 information paper to improve the quality of the estimates. These include:

- calibration of the modelled SA4 estimates to the state and territory level estimates from the LFS, rather than national level estimates
- improvements to the COVID-19 correction moving from a simple level shift to dynamic corrections
- improvements to the quality of the sub-state estimates in the Single Touch Payroll (STP) data used as an input to the model.

Method used to model estimates

The ABS has developed a Rao-Yu area-level time series model to produce these estimates. The model uses direct (weighted) survey estimates from the LFS in combination with supplementary administrative data to separately model employment and unemployment. It draws on the strengths of more granular and frequently updated administrative data to provide a more stable and reliable series of estimates.

- The unemployment model relies primarily on a time series relationship with the JobSeeker and Youth Allowance recipients data from the Department of Social Services (DSS).
- The employment model relies primarily on a relationship with Single Touch Payroll (STP) data from the Australian Tax Office, although it also makes some use of the JobSeeker and Youth Allowance recipients data from DSS.

Estimates of persons not in the labour force (NILF) are derived as the residual of the SA4 population that is neither employed nor unemployed.

For more detailed information about the model, please see [A Rao-Yu model for small area estimation of labour force statistics \(/statistics/research/rao-yu-model-small-area-estimation-labour-force-statistics\)](#) (October 2023) and [Improving SA4 level estimates from the Labour Force Survey using administrative data models \(/statistics/detailed-methodology-information/information-papers/improving-sa4-level-estimates-labour-force-survey-using-administrative-data-models\)](#) (June 2023).

Updated SA4 level estimates

An updated set of modelled estimates have been produced for each SA4 for:

- employed persons
- unemployed persons
- persons not in the labour force (NILF)
- associated rates (employment-to-population ratio, unemployment rate and participation rate).

These are provided in the spreadsheet below for the following periods:

- unemployed persons - July 2016 to August 2023
- employed persons, NILF, unemployment rate, employment-to-population ratio and participation rate - January 2020 to August 2023.

Employed persons and the residual NILF data and associated rates are available from January 2020 as the STP data used in the model is only available from this time-period.

Modelled estimates by labour force status, by SA4

[↓ Download XLSX](#)
[199.18 KB]

The map of Australia below shows the updated modelled unemployment rates for SA4s in August 2023 (based on the 2021 ASGS boundaries).

Updated modelled SA4 Unemployment rate, August 2023 (Original)

Loading map...

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Data for the ACT are the direct survey estimates.

Western Australia - Outback (North) and Western Australia - Outback (South) are modelled as a combined SA4.

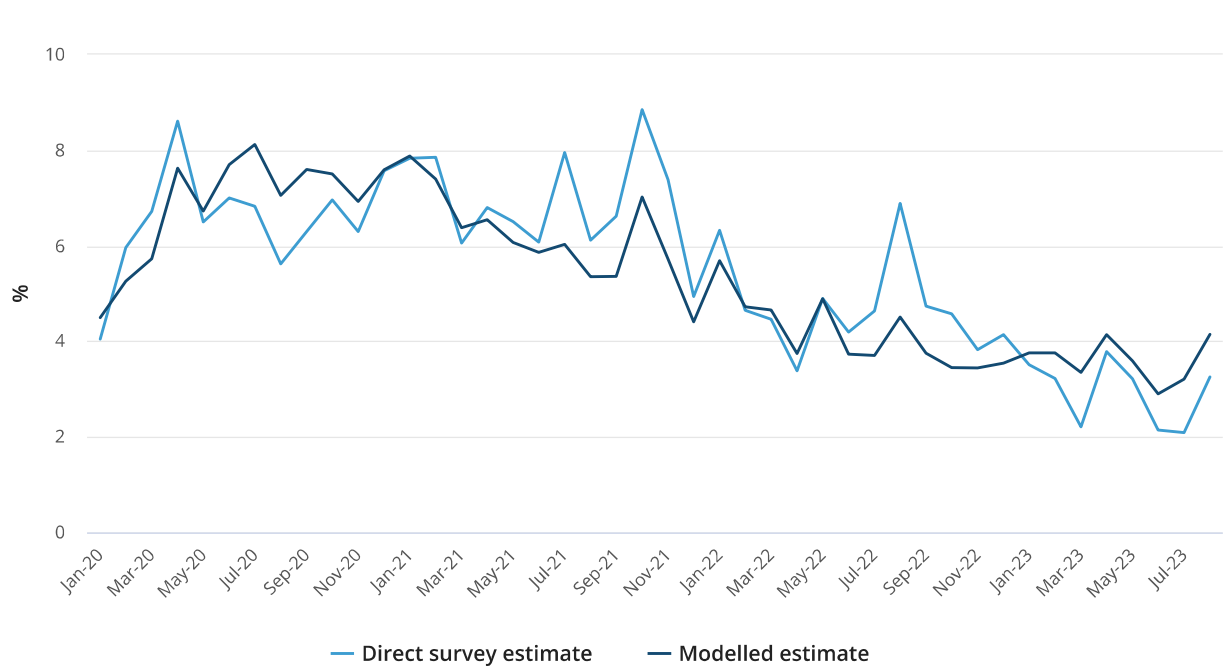
The graphs below compare the direct LFS estimates and updated modelled estimates – for Employed persons and the Unemployment rate – for a selected metropolitan and regional SA4 in each state and the Northern Territory through to August 2023. The same SA4s are presented in this information paper and the June 2023 information paper.

As data for the Australian Capital Territory are the direct survey estimates, these have not been graphed below.

New South Wales

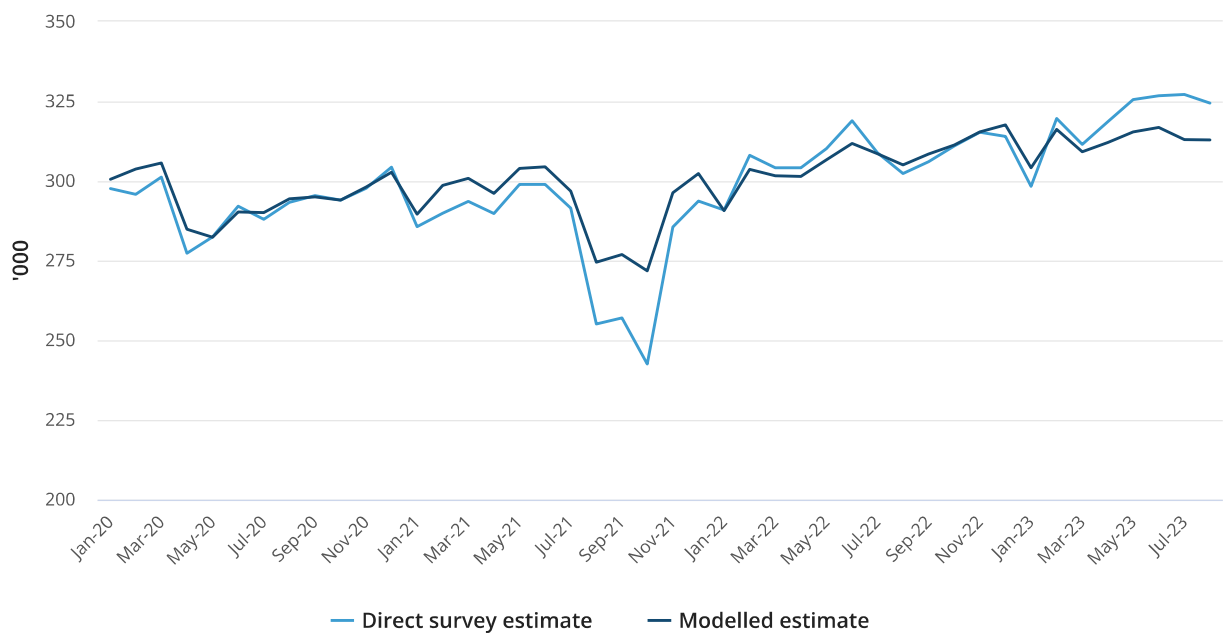
Sydney - Inner South West

Unemployment rate, Sydney - Inner South West (Original)



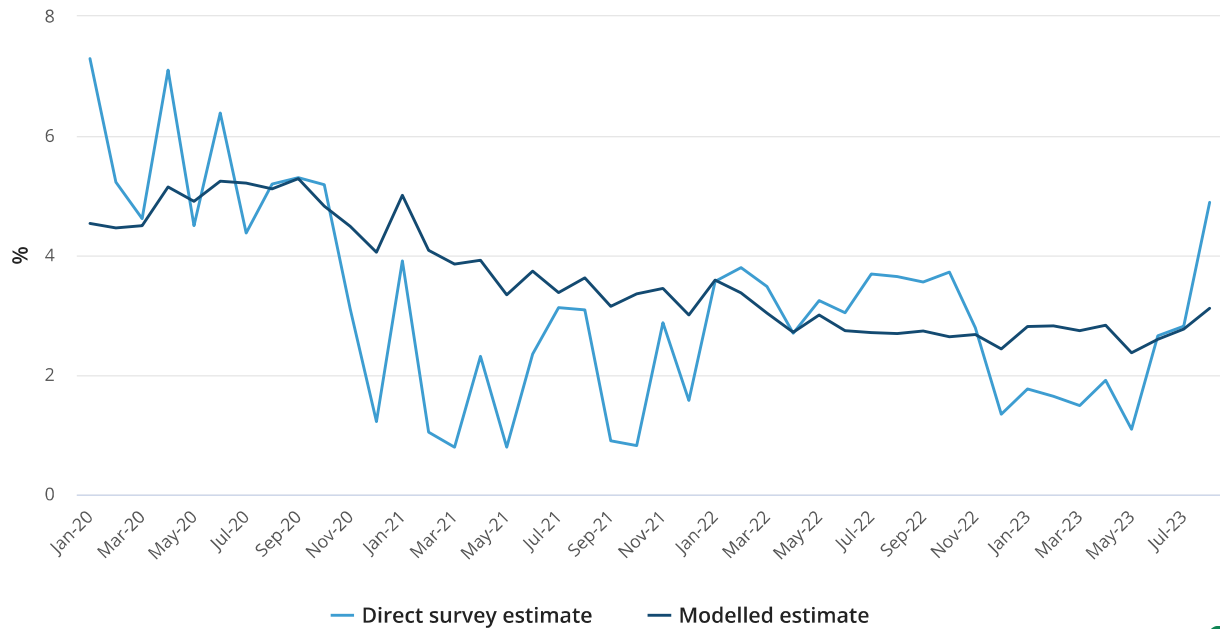
Employed persons, Sydney - Inner South West (Original)

Feedback

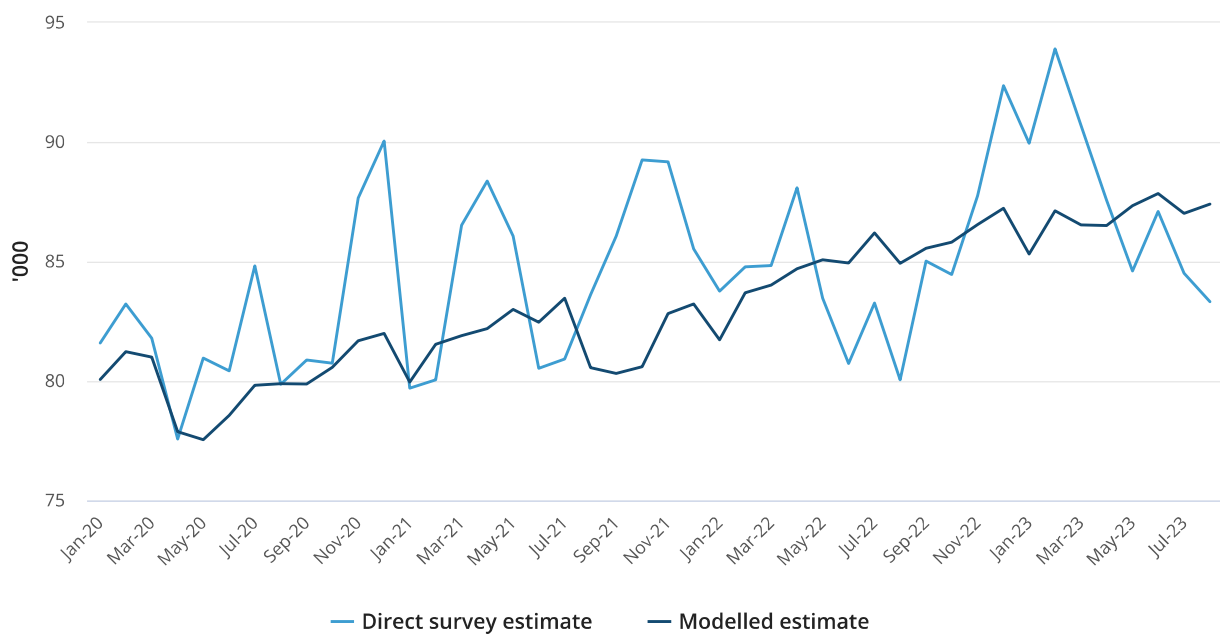


Riverina

Unemployment rate, Riverina (Original)



Employed persons, Riverina (Original)

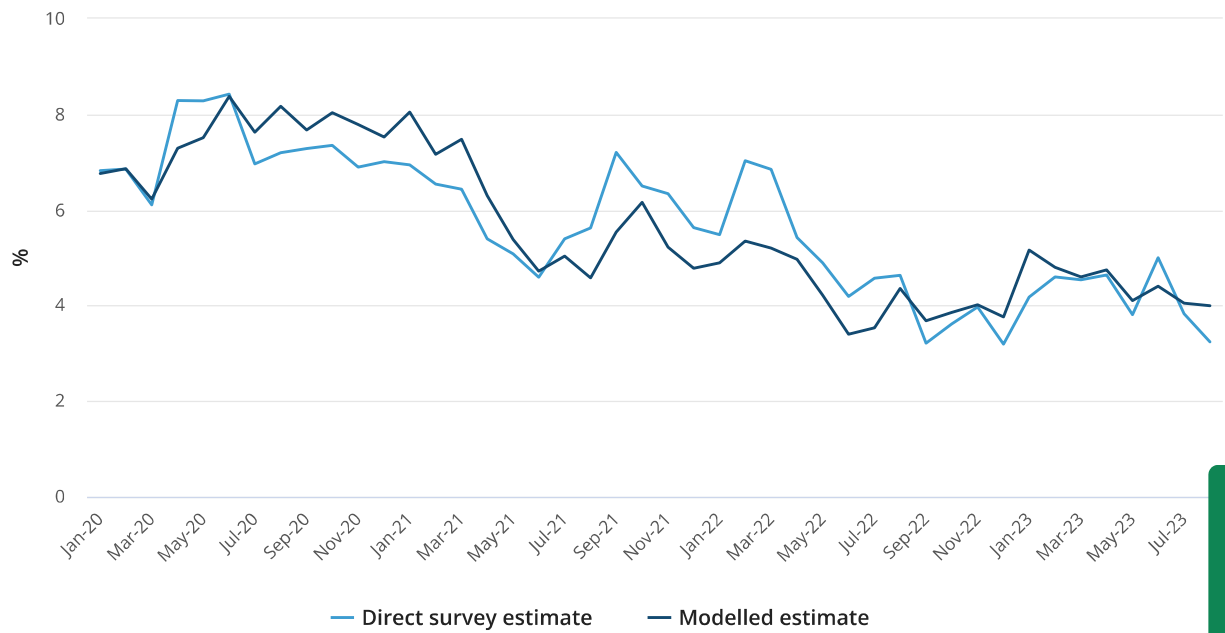


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Victoria

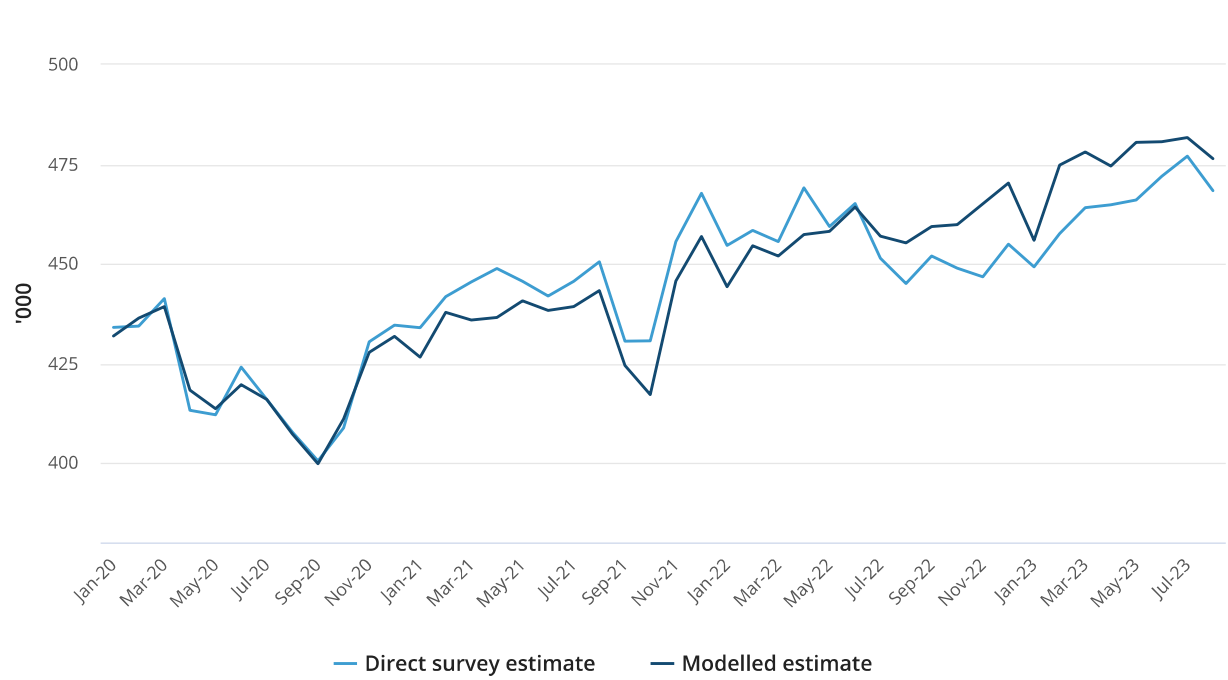
Melbourne - South East

Unemployment rate, Melbourne - South East (Original)



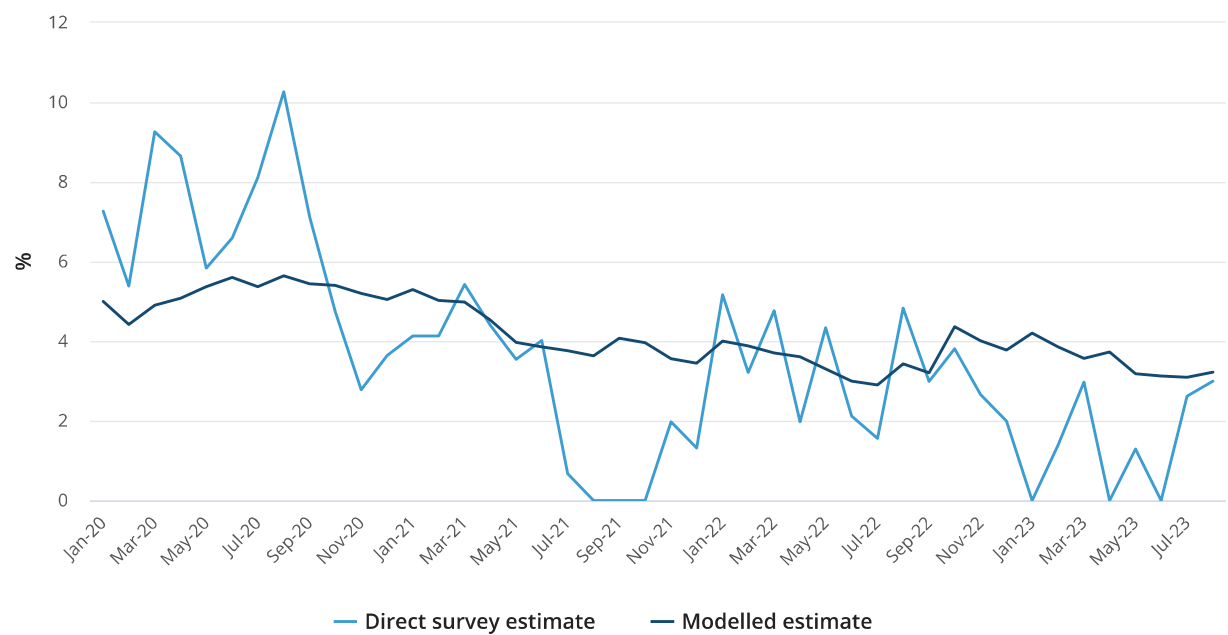
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Employed persons, Melbourne - South East (Original)

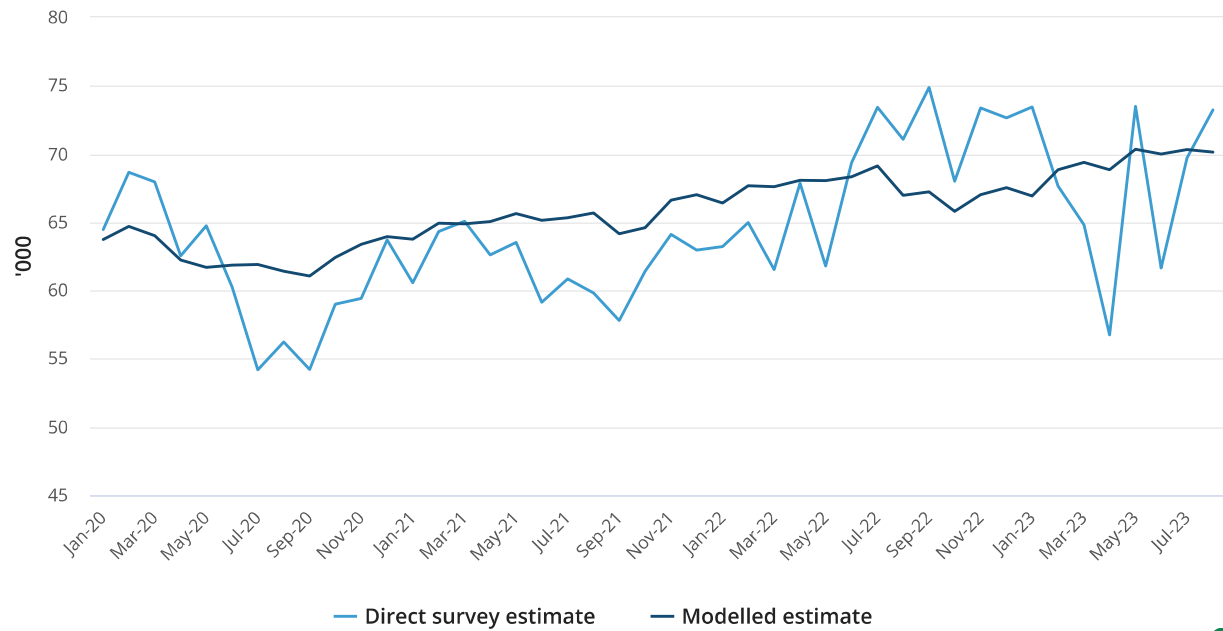


Shepparton

Unemployment rate, Shepparton (Original)



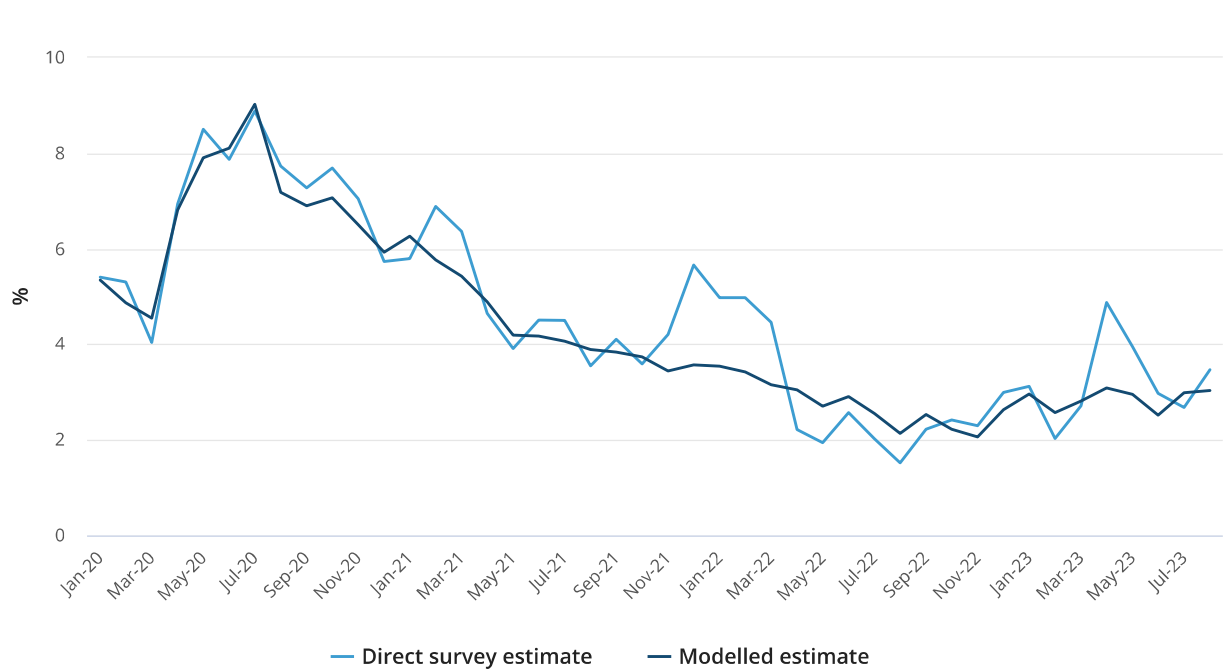
Employed persons, Shepparton (Original)



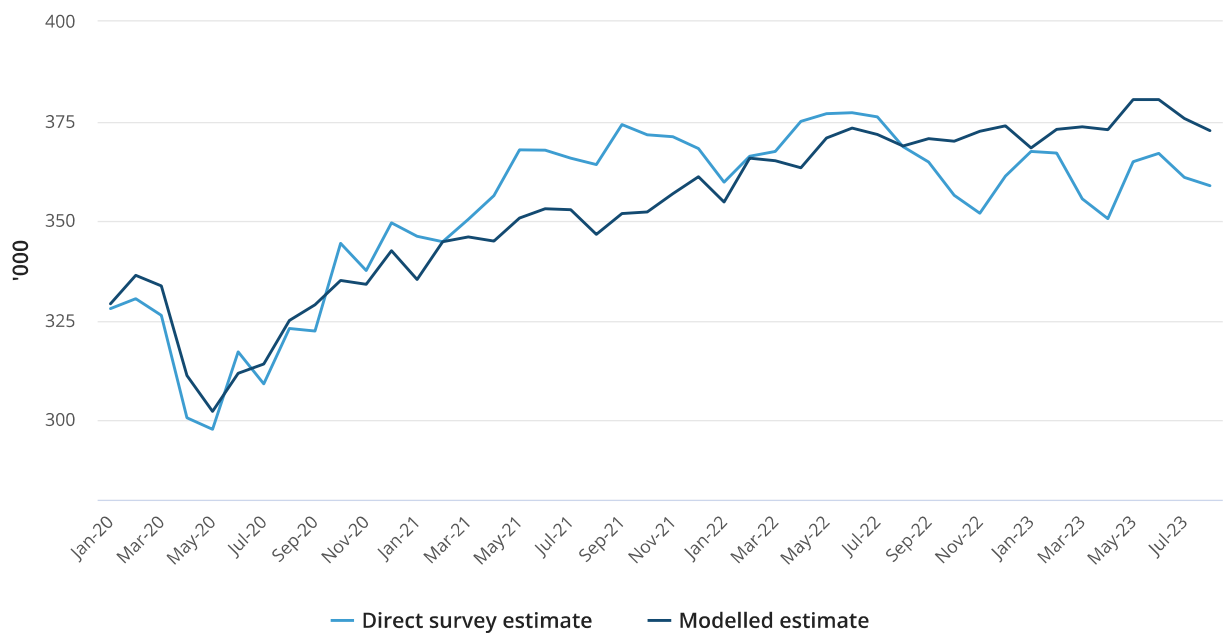
Queensland

Gold Coast

Unemployment rate, Gold Coast (Original)



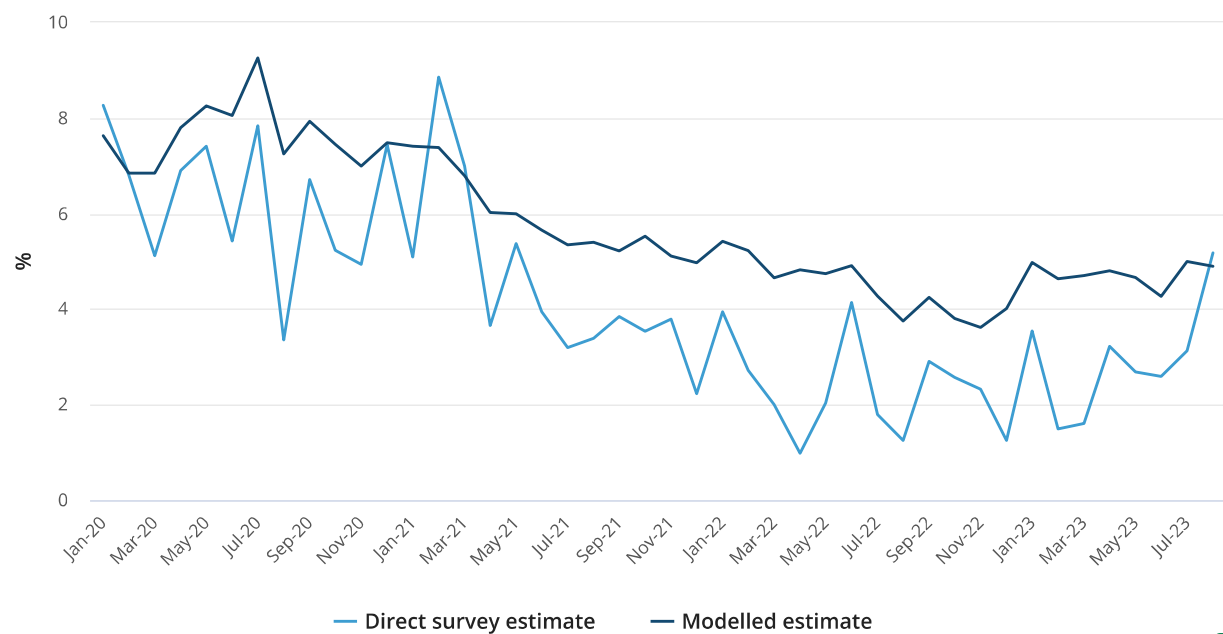
Employed persons, Gold Coast (Original)



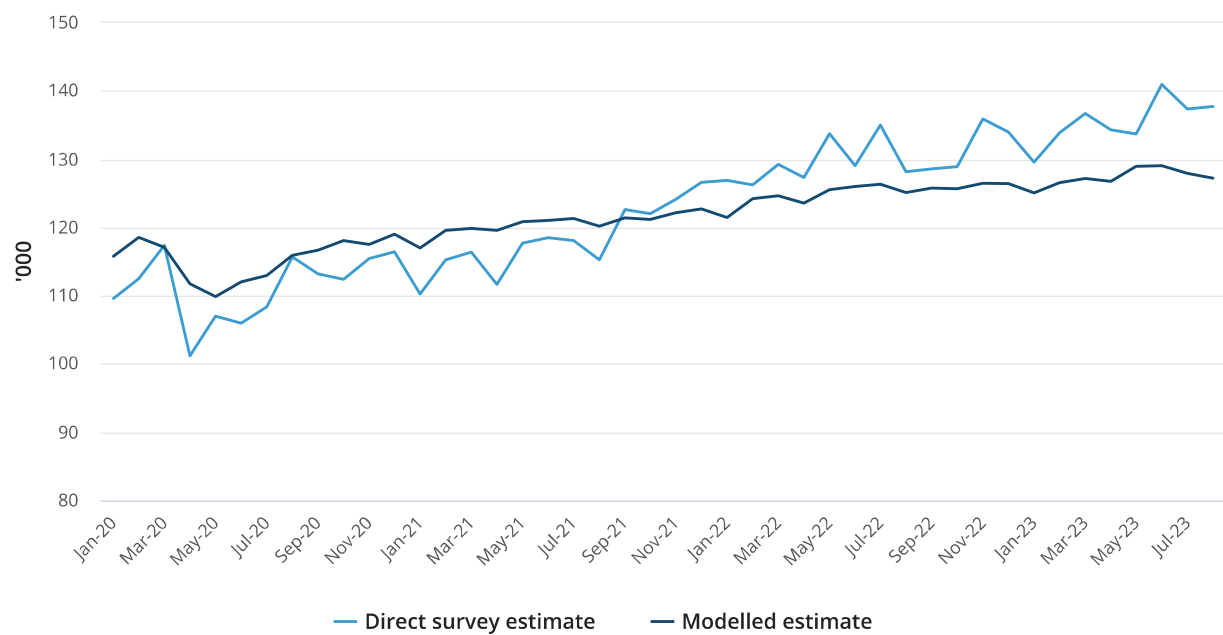
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Townsville

Unemployment rate, Townsville (Original)



Employed persons, Townsville (Original)

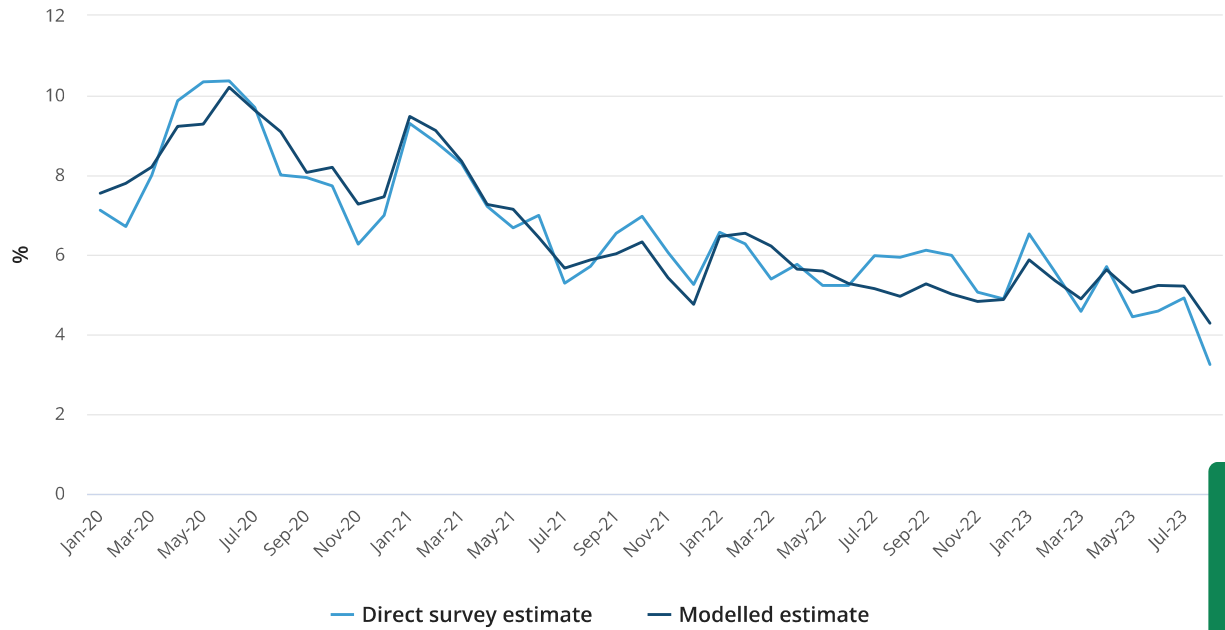


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South Australia

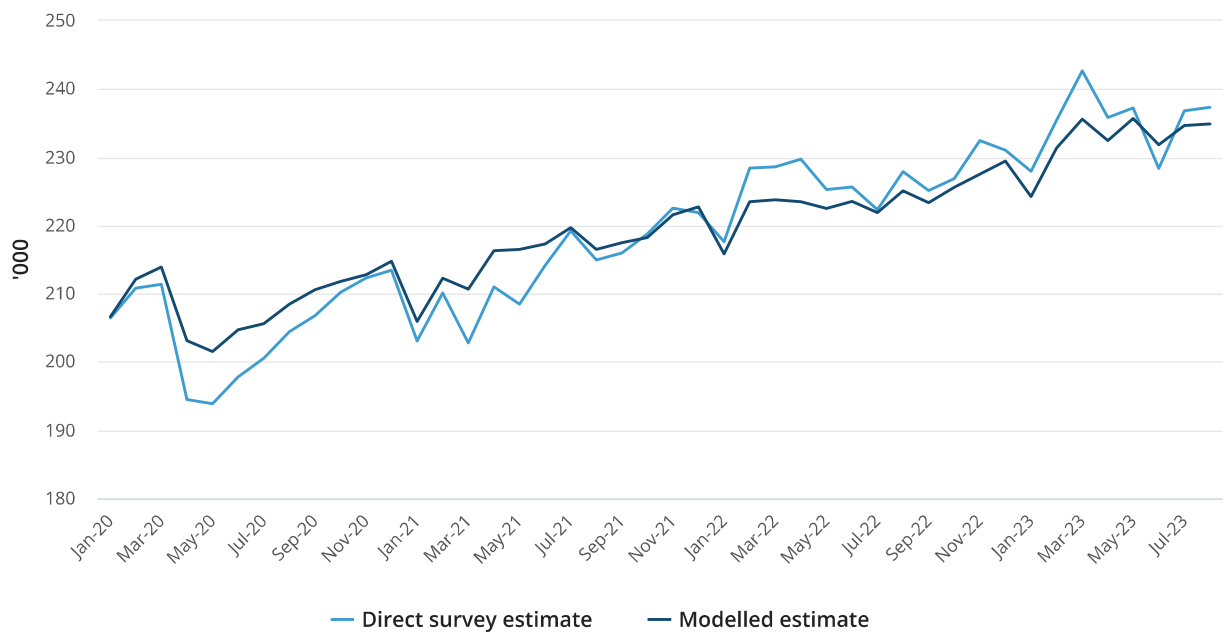
Adelaide - North

Unemployment rate, Adelaide - North (Original)



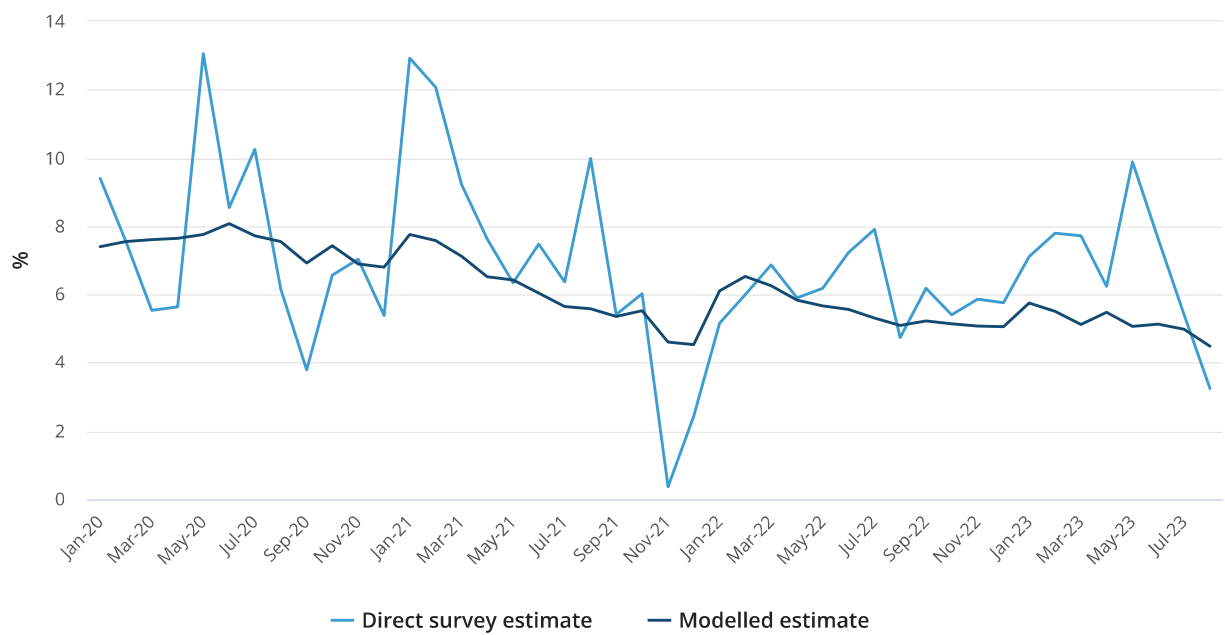
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Employed persons, Adelaide - North (Original)

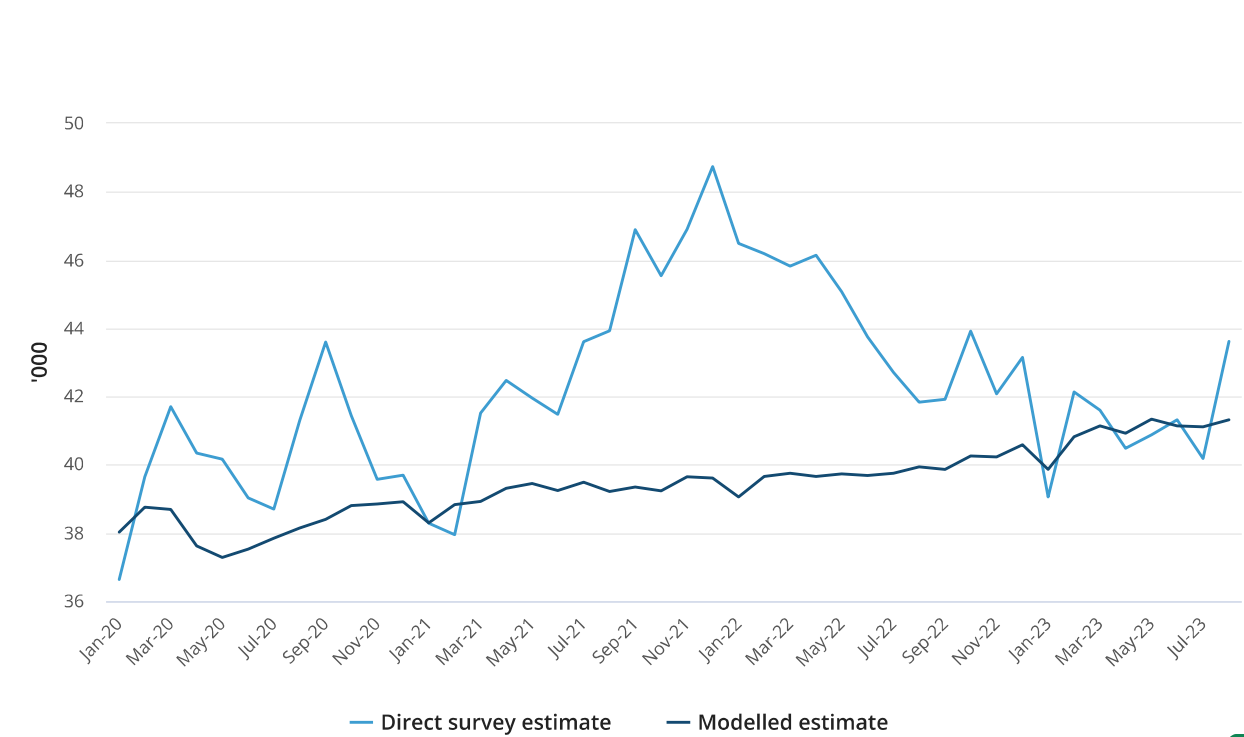


South Australia - Outback

Unemployment rate, South Australia - Outback (Original)



Employed persons, South Australia - Outback (Original)

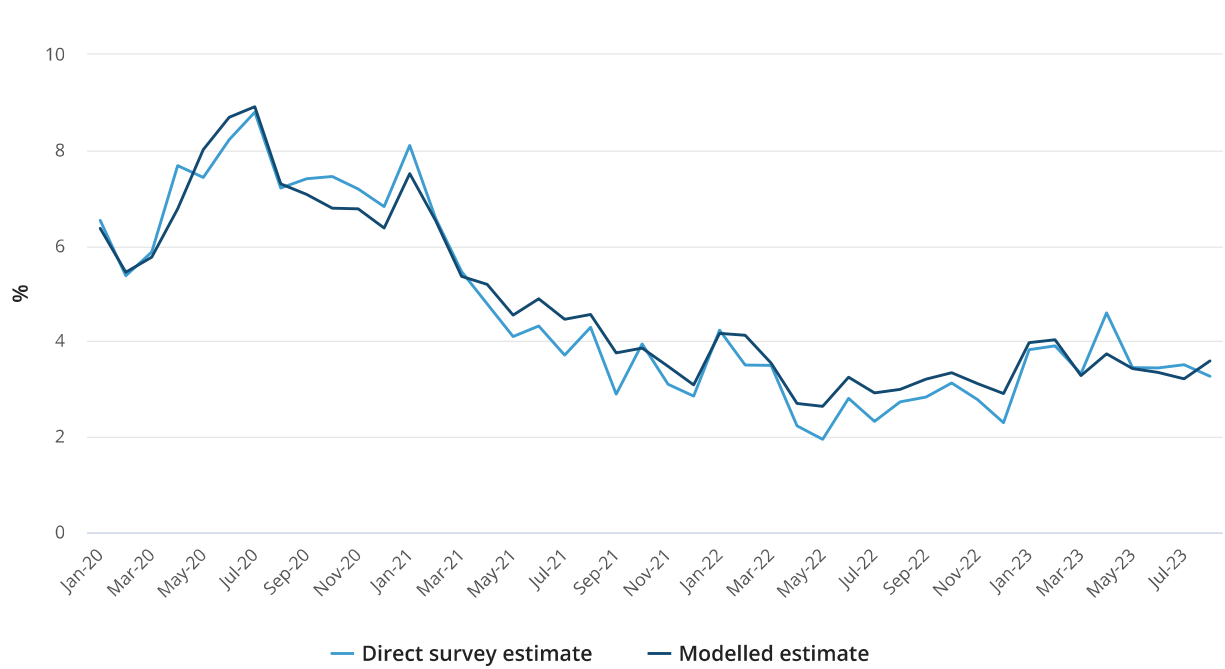


Western Australia

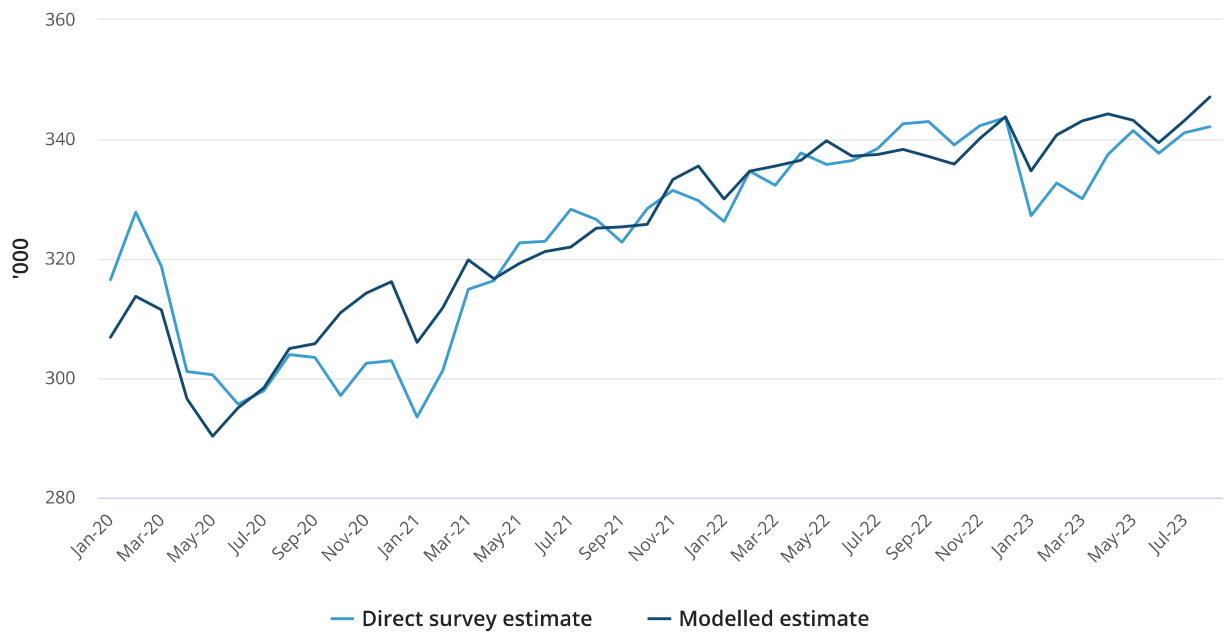
Perth - North West

Unemployment rate, Perth - North West (Original)





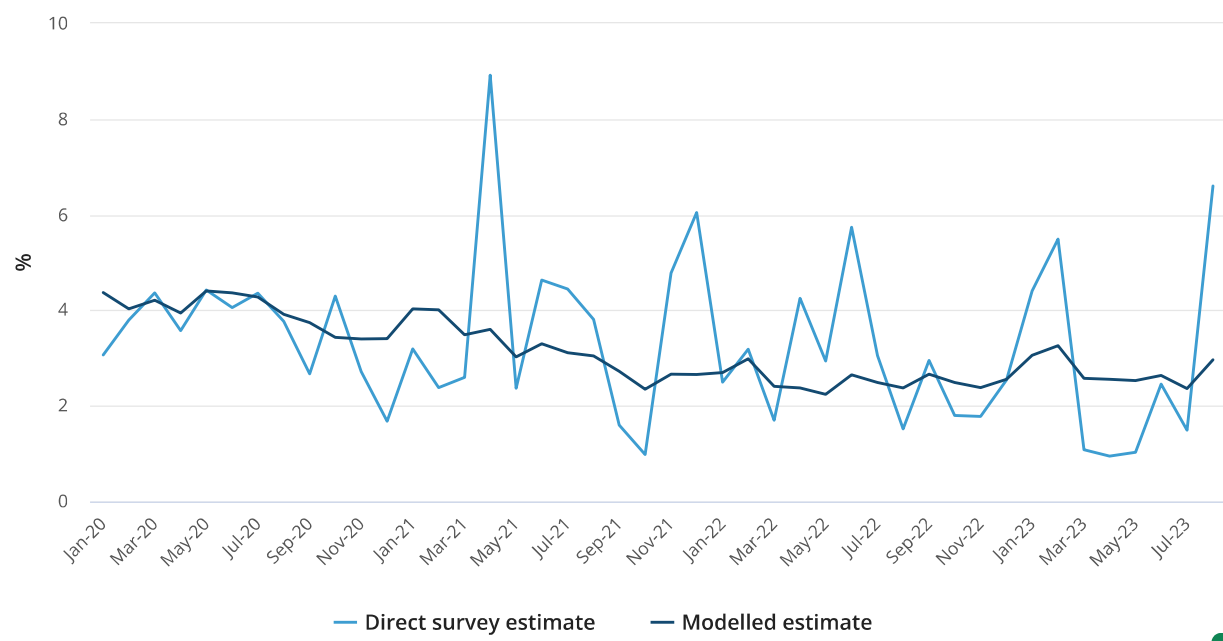
Employed Persons, Perth - North West (Original)



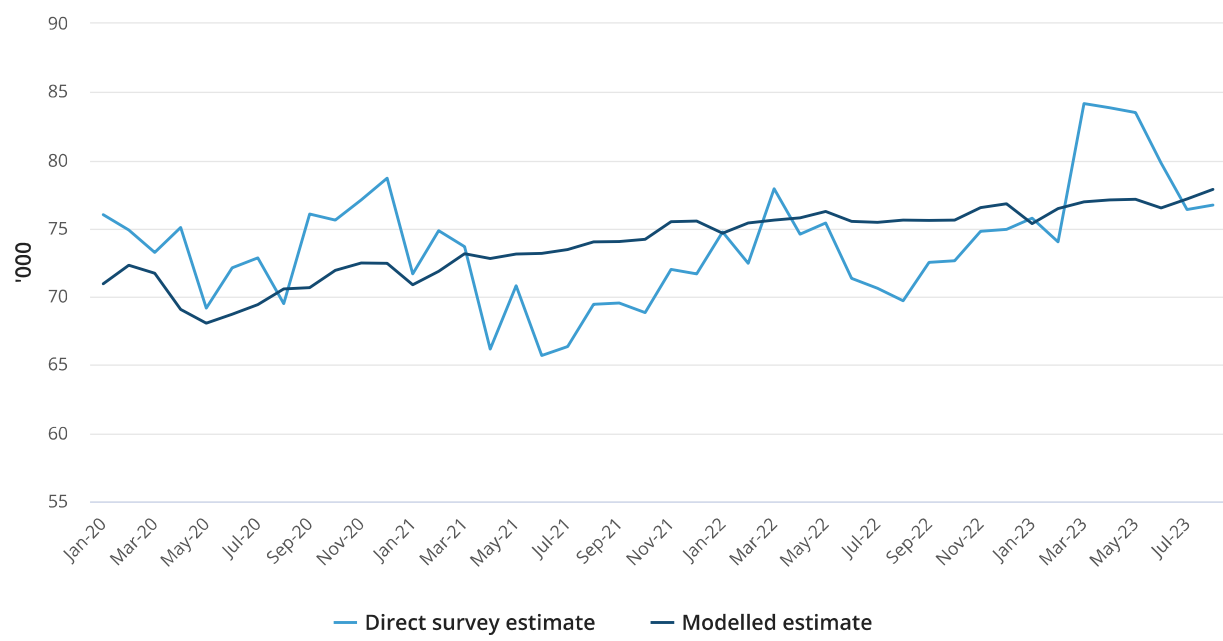
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Western Australia - Wheat Belt

Unemployment rate, Western Australia - Wheat Belt (Original)



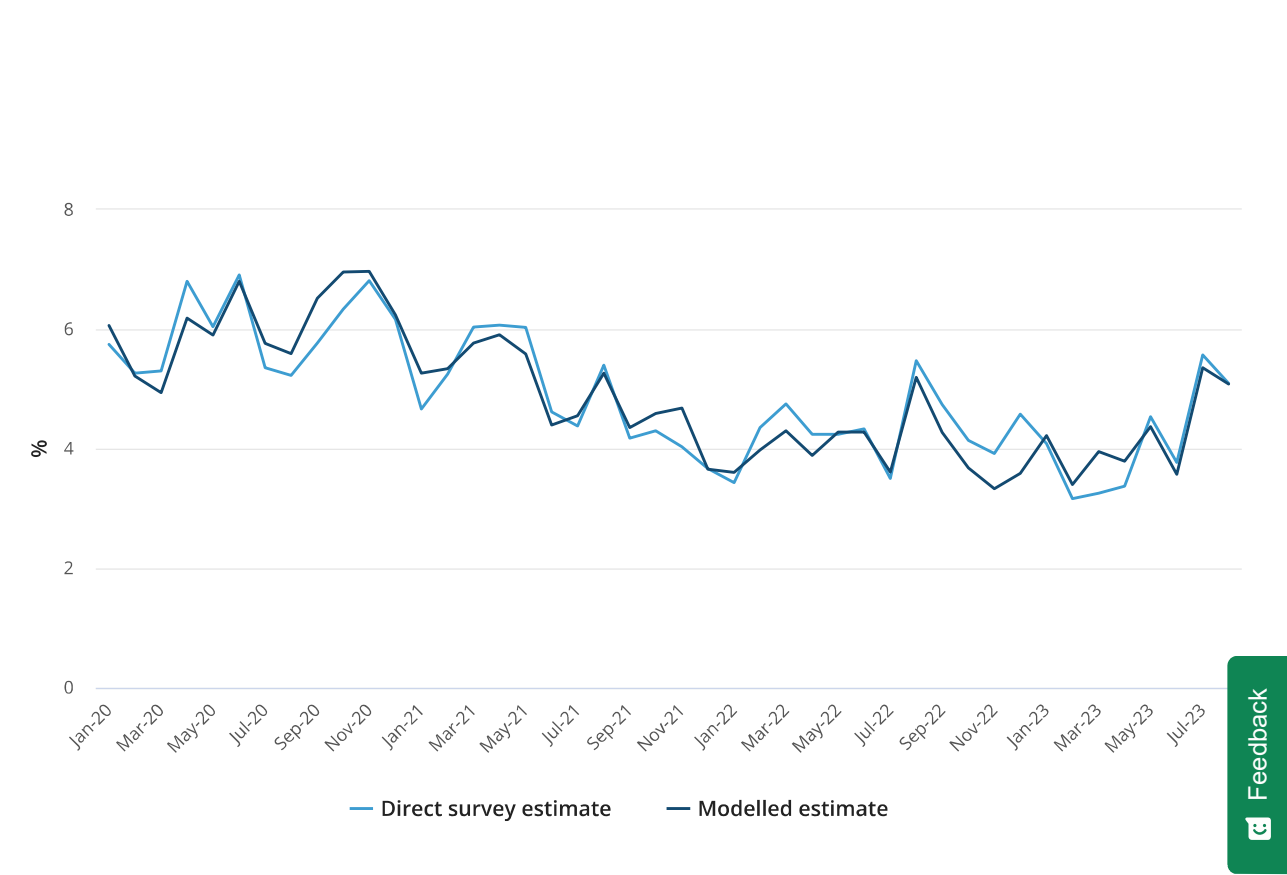
Employed persons, Western Australia - Wheat Belt (Original)



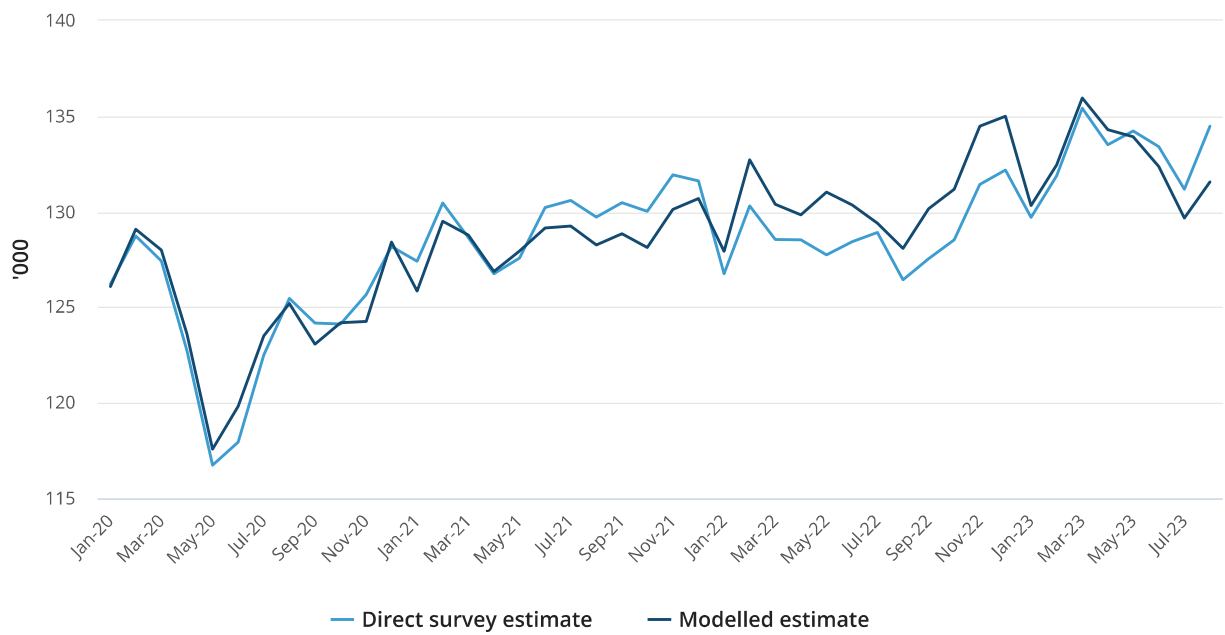
Tasmania

Hobart

Unemployment rate, Hobart (Original)

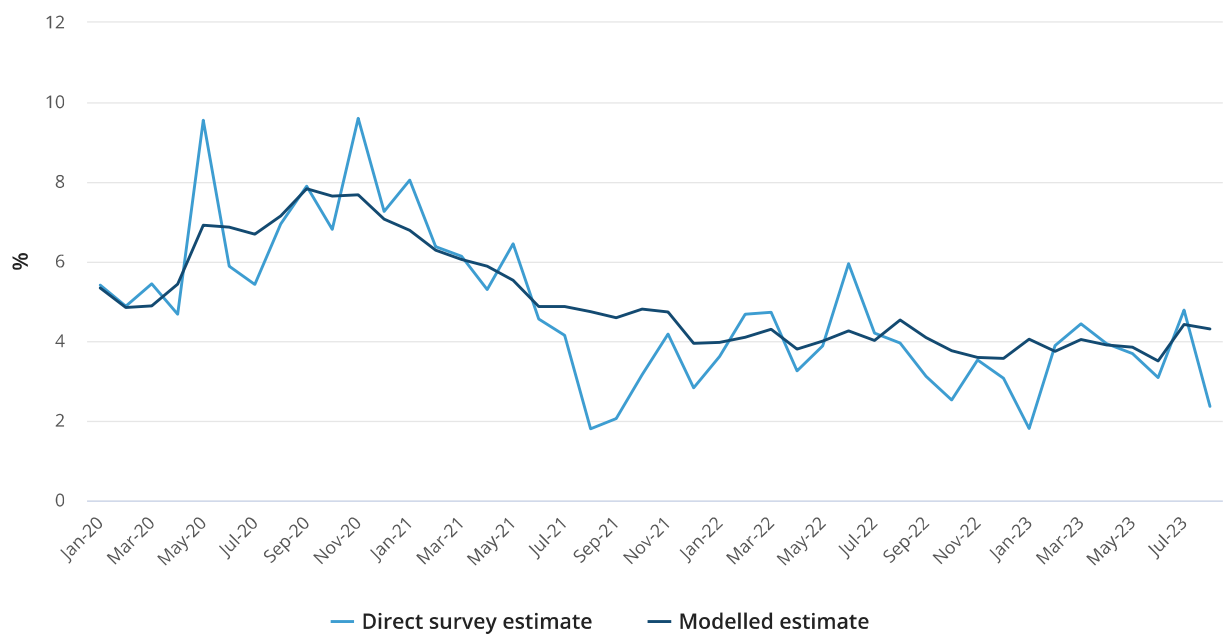


Employed persons, Hobart (Original)



Tasmania - South East

Unemployment rate, Tasmania - South East (Original)



Feedback

Employed persons, Tasmania - South East (Original)

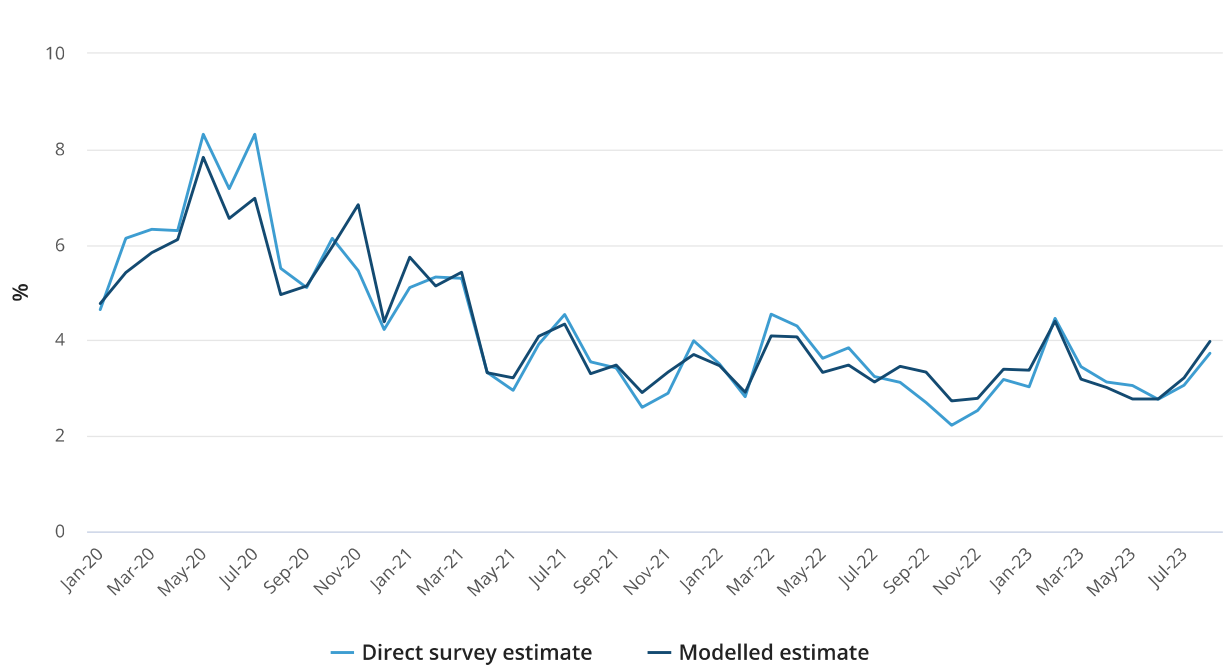


Northern Territory

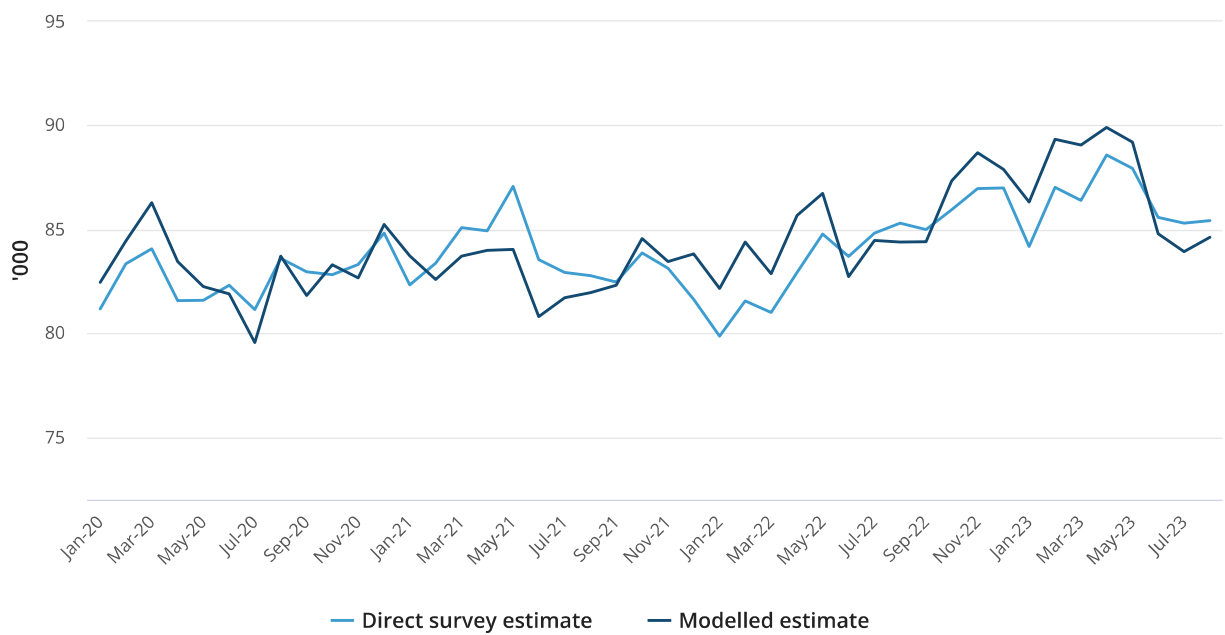
Darwin

Unemployment rate, Darwin (Original)





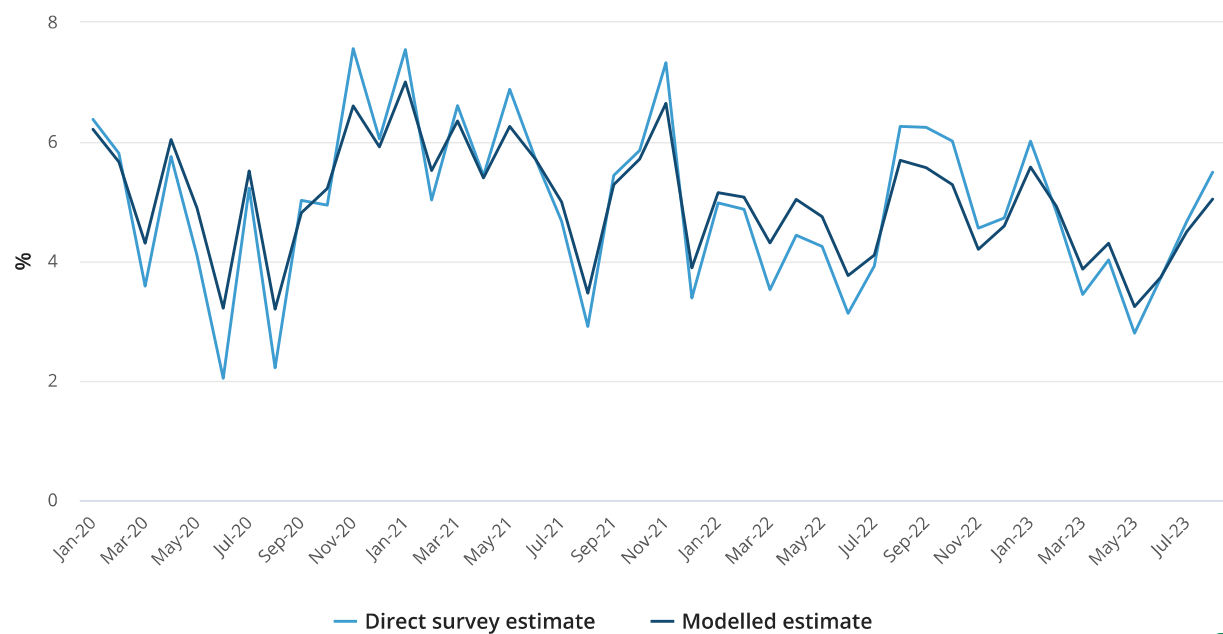
Employed persons, Darwin (Original)



Feedback

Northern Territory - Outback

Unemployment rate, Northern Territory - Outback (Original)



Employed persons, Northern Territory - Outback (Original)



Revisions

Modelled SA4 level labour force estimates will be subject to revision over time. Revisions may relate to:

- annual updates required to the Rao-Yu area-level time series model
- updates to include or reflect changes in the sub-state geography of the resident civilian population of Australia aged 15 years and over
- changes in the underlying source data, particularly the receipt of more complete STP data.

The ABS will issue advice to users when larger rates of revision are expected. While revisions will cause minor changes to the historical time series, they also bring improvements to the accuracy of the modelled estimates.

Release plans

The modelled SA4 level labour force estimates will be implemented into the regular set of LFS outputs, and published monthly. The first monthly release of the modelled SA4 estimates is expected to be published in February 2024, with January 2024 being the latest month of data available.

Initially, these modelled SA4 estimates will be added to [Labour Force, Australia, Detailed \(/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/latest-release\)](/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/latest-release) approximately a week after it is first published. The detailed release comes out a week after the main LFS release, and contains detailed data not in the first release including the direct survey SA4 estimates. The ABS are working towards publishing modelled estimates at the same time as the direct survey estimates, without the one week delay.

The current SA4 level direct survey estimates will continue to be published for some time, before being replaced by the modelled estimates. The ABS will communicate changes to release plans and the cessation of current SA4 level direct survey estimates prior to implementing these changes.



Future plans

Over the next year the ABS will also explore areas to further expand the modelled labour force estimates:

- Additional detail for the SA4 level estimates including a breakdown by full-time/part-time, sex and age groups to replicate the disaggregations currently available via direct survey estimates.
- Methods to produce estimates at finer-level geographies (e.g. SA2, SA3 and local government area (LGA) level). Further information on this work will be published in mid-2024.

In addition, the ABS will explore further refinements to the Rao-Yu area-level time series model, including multivariate modelling and using replication methods to produce measures of uncertainty for the month-to-month movements and for unemployment rates. Refinements to the model will result in revisions to published estimates and the ABS will provide advice to users when this occurs.

Detailed model methodology

A detailed description of the model methodology is available in [A Rao-Yu model for small area estimation of labour force statistics \(/statistics/research/rao-yu-model-small-area-estimation-labour-force-statistics#2-modelling\)](/statistics/research/rao-yu-model-small-area-estimation-labour-force-statistics#2-modelling). This paper outlines:

- the modelling process
- the rationale for choosing an area-level multilevel model (Rao-Yu)
- data sources and explanatory variables

- seasonality
- sampling error
- bias corrections for logarithmic transform
- COVID-19 corrections
- calibration to the labour force survey estimates at state or national level
- uncertainty estimation.

Feedback

If you would like to provide feedback or have any questions, please email labour.statistics@abs.gov.au (<mailto:labour.statistics@abs.gov.au>).

